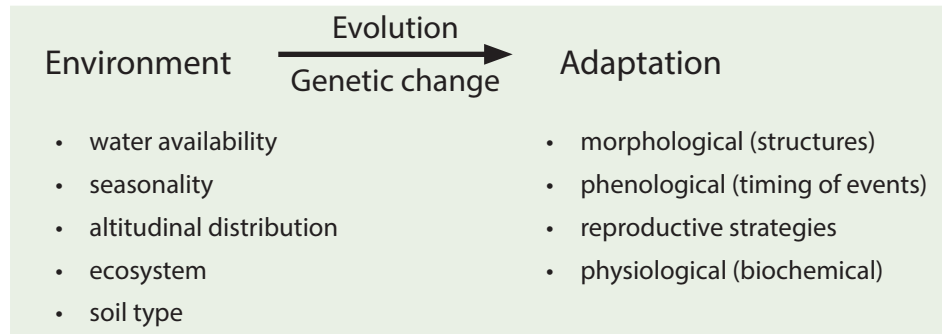


4. Where plants grow and why

Plants grow in a range of environmental conditions that vary from site to site depending on the geology and the climate.




Autecology is the study of an organism and how it relates to its environment. It focuses on why a plant is distributed in a certain way and on phenological (timing of flowering and fruiting) morphological and physiological adaptations, population dynamics, genetics and evolution.



Environmental adaptation

Plants become adapted to the conditions they evolve in. The more extreme the conditions the more extreme the adaptation. Environmental adaptation in plants can be described in terms of adaptation to water and seasonality (usually temperature).

Three terms describe plants' adaptation to water:






<p>Xerophyte (arid): adapted to extremely dry conditions or physiological drought (such ice or salt).</p>  <p>e.g., <i>Myosotis albosericea</i>. Photo: John Barkla.</p>	<p>Mesophyte: adapted to moderate conditions of dry or moisture; most plants.</p>  <p>e.g., cabbage tree (<i>Cordyline australis</i>)</p>	<p>Hydrophyte (aquatic): wholly or partly submerged in water.</p>  <p>e.g., mangrove (<i>Avicennia marina</i> subsp. <i>australasica</i>).</p>
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Seasonality

An interesting aspect of the New Zealand floras response to seasons is that most native plants are evergreen, meaning they bear foliage throughout the year. Deciduous plants have leaves that fall off or are shed seasonally to avoid adverse weather conditions such as cold or drought. Some examples of deciduous trees in New Zealand include tree fuchsia, shrubby tororaro, and lowland ribbonwood.

Altitudinal distribution

Different plants are found in different altitudinal zones. This **altitudinal zonation** can be very distinct (e.g., the tree line on mountains) and is usually an indication of changing temperatures. Altitudinal distribution of plants is usually described as five zones:

<p>Coastal: On or near the sea coast, e.g., pīngao, karo.</p> 	<p>Lowland: Altitude of less than 500 m, e.g., maire, kohuhu, black beech.</p> 	
<p>Montane: Between approx 500 m and the tree line, e.g., mountain beech.</p> 	<p>Subalpine: Above the tree line to the snow zone, e.g., leatherwood, tussock grasses.</p> 	<p>Alpine: The snow zone, e.g., lichens, algae and herbaceous plants; no tussock grasses.</p>  <p>Photo: Les Molloy.</p>

Zones change with latitude. For example, in the sub-antarctic islands, subalpine type plants may grow on the coast.

Some books specialise in plants of particular zones (e.g., Andrew Crowe's "Which Coastal Plant") or have separate sections on zones (e.g., Salmon's "New Zealand Flowering Plants in Colour"). For the purposes of plant identification you can narrow down your search by knowing which zone/habitat you are in.

Ecosystem distribution

An ecosystem is a living community which interacts with its environment. Ecosystems are often less clear cut and 'tidy' than altitudinal zonation and ecosystems can exist within other ecosystems e.g., freshwater streams within a forest. Ecosystems were originally thought of as closed systems, but they are now regarded as continuous interacting mosaics up to landscape scale. Examples of ecosystem descriptions are shown below:

Some plant identification books specialise in ecosystem types, such as *Wetland Plants in New Zealand* by Peter Johnson & Pat Brooke and *Flowering Plants of New Zealand* by John Salmon which is organised by habitat/ecosystem.

Marine: Saltwater, offshore.



Saltwater Estuarine: Tidal, on the margin of ocean, river and coast.



Riparian/Freshwater: flowing water bodies with vegetation mainly on banks.



Duneland: Sandy, coastal margin, lightly vegetated.



Shrubland: Low canopy, small tree or shrub dominated.



Freshwater Wetland: Low lying, highly saturated, fertile areas with still waters.



Peat bog: Low lying, highly saturated with deep peat layers. Very acid and low fertility.



Photo: Barbara Mitcalfe.

Lacustrine (lake): Large, still water bodies. Can be highly nutrient enriched (eutrophic) e.g., Lake Wairarapa; medium enriched (mesotrophic) e.g., Lake Taupo; or low nutrient (oligotrophic) e.g., Lake Wakatipu.



Grassland: Tussock dominated, generally drier.



Herbfield: No canopy, herb dominated. Often wet, cold, boggy or higher altitude.



Photo: Vivienne McGlynn.

Fellfield / scree: Rocky areas. Dominated by small herbs. Usually higher altitude.



Alpine / nival: High altitude; dominated by lichen and algae.



Photo: Les Molloy.

Forest: Tall canopy of trees. Often wetter, more fertile and sheltered areas.



There are many other types of ecosystem, such as sandy desert, stony desert, volcanic, tundra, etc. However, those shown here are the most common in New Zealand.